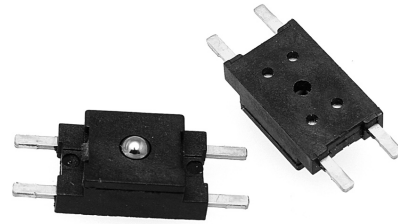


# Force Sensors Line Guide



**Leadership, in full force.** Whether it's critical applications such as IV drips or dialysis, or serious engineering like robotic end-effectors, Honeywell Sensing and Control (S&C) offers an unbeatable line of force sensor options. These sensors measure the addition or backup of force — meaning, the resistance of silicon-implanted piezoresistors will increase when flexed under applied force. Each sensor concentrates force directly to the

silicon-sensing element through a stainless steel plunger, with the amount of resistance changing in proportion to the amount of force applied. This change in circuit resistance results in a corresponding mV output level. Honeywell S&C force sensors also deliver built-in stability and flexibility, to provide enhanced performance in most applications.

## FEATURES

### FORCE SENSORS

#### FSG Series.

**Features:** Precision force sensing

- Ratiometric output • Robust performance characteristics
- Adaptable product design • Available signal conditioning

**Benefits:** Piezoresistive sensing technology designed to provide precise, often reliable force sensing in a compact, commercial-grade package. Wheatstone bridge circuit design provides inherently stable mV outputs over force range. Package design incorporates a patented modular construction. Innovative elastomeric technology and engineered molded plastics result in load capacities of 5,500 g overforce. Stainless steel plunger provides enhanced mechanical stability and is adaptable to a variety of potential applications.

#### FSS Series.

**Features:** Precision force sensing

- Ratiometric output • Robust performance characteristics
- Adaptable product design

**Benefits:** Piezoresistive sensing technology designed to provide precise, often reliable force sensing in a compact, commercial-grade package. Wheatstone bridge circuit design provides inherently stable mV outputs over force range. Sensor package design incorporates a patented modular construction. Innovative elastomeric technology and engineered molded plastics results in load capacities of 4,500 g overforce. Stainless steel plunger provides enhanced mechanical stability and is adaptable to a variety of potential applications.

#### 1865 Series.

**Features:** Silicon pressure/force interface diaphragm • Force measurement for potential infusion pump applications

- Pressure measurement for liquid media
- Medical-grade materials • 8-pin DIP electrical connection • Laser trimmed
- Choice of voltage or constant current excitation • Temperature compensated

**Benefits:** Enhanced performance force/pressure transducers specifically designed to address needs of potential

medical and specialized OEM applications such as infusion and syringe pumps, blood pressure equipment, and drug delivery systems. Reliable replacement for older force or load cell transducers. Silicon rubber diaphragm allows sensor to be compatible with some potential liquid media applications. Laser-trimmed compensation may be specified to operate with a constant current or voltage supply.

#### FS01/FS03 Series.

**Features:** High-level output range

- Temperature compensated • Calibrated zero and span • Zero noise

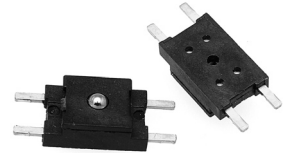
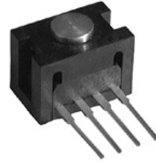
**Benefits:** Piezoresistive-based force sensor for potential applications including medical infusion pumps, ambulatory noninvasive pump pressure, occlusion detection, and kidney dialysis machines. High-level voltage output, calibrated, and temperature compensated sensors give accurate and stable output over temperature range. Features integrated circuit sensor element and laser-trimmed

# Force Sensors Line Guide

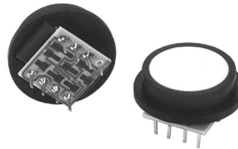
## Your applications, our engineering: A powerful force.

The Honeywell S&C force sensor design incorporates a patented modular construction. What's more, our innovative elastomeric technology and engineered molded plastics result in load capacities of 4,000 g over-force. This unique design also provides a variety of mounting options, including application-specific requirements — plus other valuable benefits: stainless steel ball actuator provides enhanced, stable mechanical performance and application adaptability; operating force of 500 g to 1500 g; sensitivity of 0.12 mV/g to 0.24 mV/g typical; operating temperature range of -40 °C to 85 °C [-40 °F to 185 °F].

Potential applications for Honeywell S&C force sensors include medical equipment such as infusion pumps, anesthesia monitors, non-corrosive non-pressurized media-level sensors, blood pressure equipment, syringe pumps, and drug delivery systems.



Force Sensors		
	FSG Series	FSS Series
<b>Signal conditioning</b>	unamplified	unamplified
<b>Technology</b>	silicon die (piezoresistive)	silicon die (piezoresistive)
<b>Output</b>	360 mV	180 mV
<b>Force range</b>	0 N to 14,7 N [0 g to 1500 g]	0 N to 14,7 N [0 g to 1500 g]
<b>Overforce</b>	54 N [5500 g]	44 N [4500 g]
<b>Operating temperature range</b>	-40 °C to 85 °C [-40 °F to 105 °F]	-40 °C to 85 °C [-40 °F to 185 °F]
<b>Storage temperature range</b>	-55 °C to 105 °C [-67 °F to 221 °F]	-40 °C to 100 °C [-40 °F to 212 °F]



Force Sensors		
	1865 Series	FS01/FS03 Series
<b>Signal conditioning</b>	calibrated	amplified
<b>Technology</b>	silicon die (piezoresistive)	silicon die (piezoresistive)
<b>Output</b>	current excitation: 100 mV typ. voltage excitation: 40 mV typ.	3 Vdc
<b>Force range</b>	0 psi to 5 psi, 0 psi to 10 psi, 0 psi to 15 psi, 0 psi to 25 psi, 0 psi to 30 psi	0 lb to 1.5 lb, 0 lb to 3.0 lb
<b>Overforce</b>	10 psi, 30 psi, 45 psi, 60 psi	7 lb
<b>Operating temperature range</b>	-28 °C to 54 °C [-18 °F to 129 °F]	0 °C to 70 °C [32 °F to 158 °F]
<b>Storage temperature range</b>	-1 °C to 54 °C [30 °F to 129 °F]	5 °C to 50 °C [41 °F to 122 °F]



## Force Sensors

### FSS-SMT Series

<b>Signal conditioning</b>	unamplified
<b>Technology</b>	silicon die (piezoresistive)
<b>Output</b>	180 mV
<b>Force range</b>	0 N to 14.7 N [0 g to 1500 g]
<b>Overforce</b>	44 N [4500 g]
<b>Operating temperature range</b>	-40 °C to 85 °C [-40 °F to 185 °F]
<b>Storage temperature</b>	-40 °C to 100 °C [-40 °F to 212 °F]

thick-film ceramic in a small plastic housing. Provides enhanced corrosion resistance and isolation to external package stress.

### **FSS-SMT Series.**

**Features:** Surface Mount Technology allows for automated assembly and may eliminate hand soldering • RoHS-compliant materials meet Directive 2002/95/EC • Low deflection (30 microns typical at full scale) help reduce measurement error • Small size minimizes space on the printed circuit board (PCB) • Electrically ratiometric output accommodates supply voltage variations, leading to low ratiometricity error • High resistance to electrostatic discharge (ESD) (8 KV) meets ESD Sensitivity Classification Level 3 • Sensor output has low sensitivity to mounting stresses

**Benefits:** Direct mechanical coupling of the actuation ball to the sense element eliminates coupling errors and keeps mechanical hysteresis to a minimum. Provides enhanced sensitivity without compromising signal integrity, resulting in low system noise and reducing measurement errors. The low voltage supply allows for use in battery powered applications. Potential medical applications include infusion pumps, ambulatory non-invasive pumps, occlusion detection, kidney dialysis machines, and enteral pumps. Potential commercial applications include load and compression sensing, variable tension control, and wire bonding equipment.

**Warranty.** Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While we provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

For more information about Sensing and Control products, visit [www.honeywell.com/sensing](http://www.honeywell.com/sensing) or call +1-815-235-6847  
Email inquiries to [info.sc@honeywell.com](mailto:info.sc@honeywell.com)

### **⚠ WARNING PERSONAL INJURY**

- DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

**Failure to comply with these instructions could result in death or serious injury.**

### **⚠ WARNING MISUSE OF DOCUMENTATION**

- The information presented in this catalogue is for reference only. DO NOT USE this document as product installation information.
- Complete installation, operation and maintenance information is provided in the instructions supplied with each product.

**Failure to comply with these instructions could result in death or serious injury.**

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